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Subject **Page**

BODY
Bodyshell

Model: **E52**
Production Date: **03/00 To Present**

Objectives of the Module

After completing this module, you should be able to:

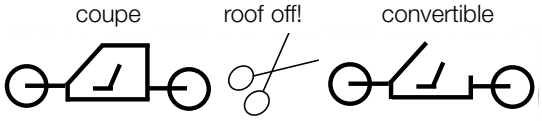
- Describe how the body shell is reinforced using aluminum components to achieve overall Torsional rigidity
- Describe the two main structure methods used to supply strength to support the chassis.
- Identify the different levels of body repair.
- Understand the Rollbar technology and the mounting fundamentals.

Body Shell

Purpose of the System

- The aim of BMW development was to achieve a high degree of rigidity in combination with low weight. This objective was achieved by using aluminum in a space frame design.
- The body of the Z8 roadster has been developed as a solid aluminum structure that combines an aluminum space frame with bolt on aluminum outer skin paneling. This design therefore renders necessary repair methods specific to aluminum.
- The aluminum outer skin panel consists of aluminum-magnesium-silicon alloy. The body framework is made up of extruded sections. The entire frame work has a weight of 225kg (496 lbs.).
- The bodyshell of the Z8 consists of a total of 287 parts, of which 87 parts are extruded sections.
  Factors of the outstanding rigity of the Z8:

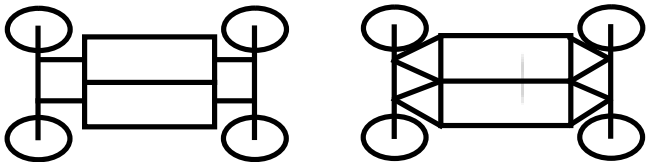
The fastest **way to a convertible:** head off



The best **way to a convertible:** use head

Optimization of the tunnel frame structure means:

Straight-ahead driving:	good	good
Bumps:	good	good
Cornering:	poor	good
Torsion:	poor	good
Longitudinal rigity:	poor	good



The aluminum space frame structure of the Z8 was evolved from this

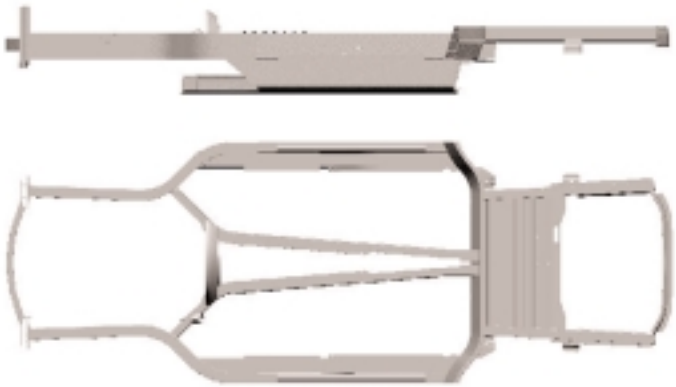
Components

Frame - Structural Views

The side and top view shown to the right reveals the formation of the frame “Y” structure.

The “Y” structure enhances strength in the Z8 application.

The depth of the side rail adds to the center strength, as well as accomodating the floor pan.

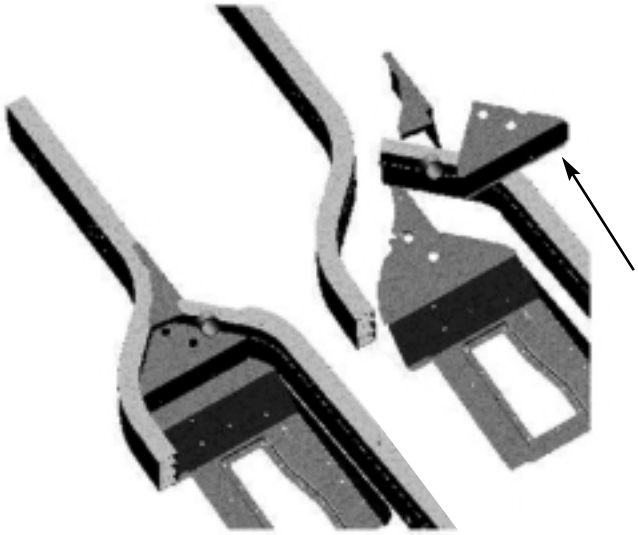


Using the “Y” structure provides the additional strength needed to compensate for the lack of a roof (open roadster).

The transmission tunnel is also a critical frame rail structure.

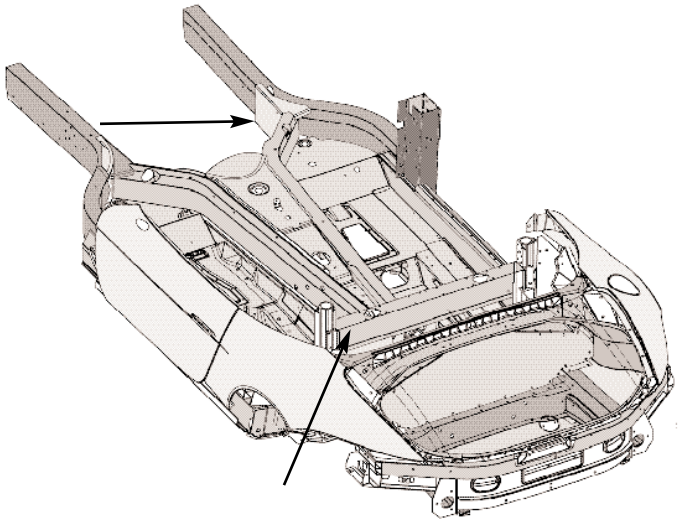
This method of construction provides two additional frame rails for center support which enhances structural rigidity.

The illustration on the right highlights the triangulation pieces that reinforce the “Y” structure.



The frame and floor pan assembly illustration on the right shows additional triangulation reinforcement pieces.

The rear support beam provides additional floor pan support as well as torsional rigidity.

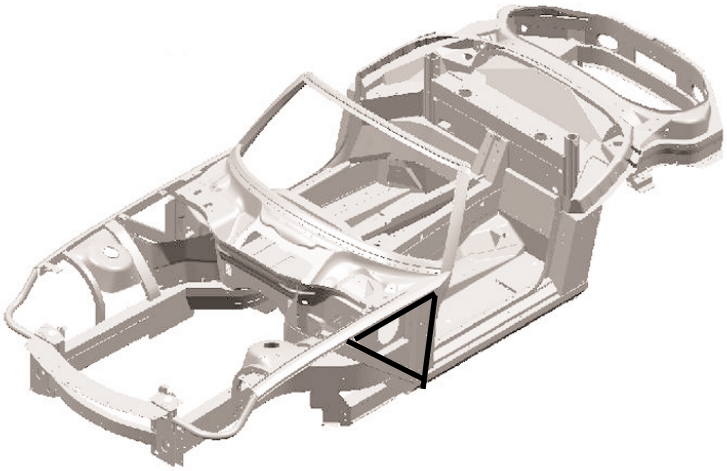


Shown on the right is the windshield frame structural mounting and engine compartment bulkhead assembly.

The aluminum “space frame” with joint connection is highlighted on the right.

To offer support for the front “clip” to the engine compartment bulkhead (preventing upward flex), the frame with a joint connection is used.

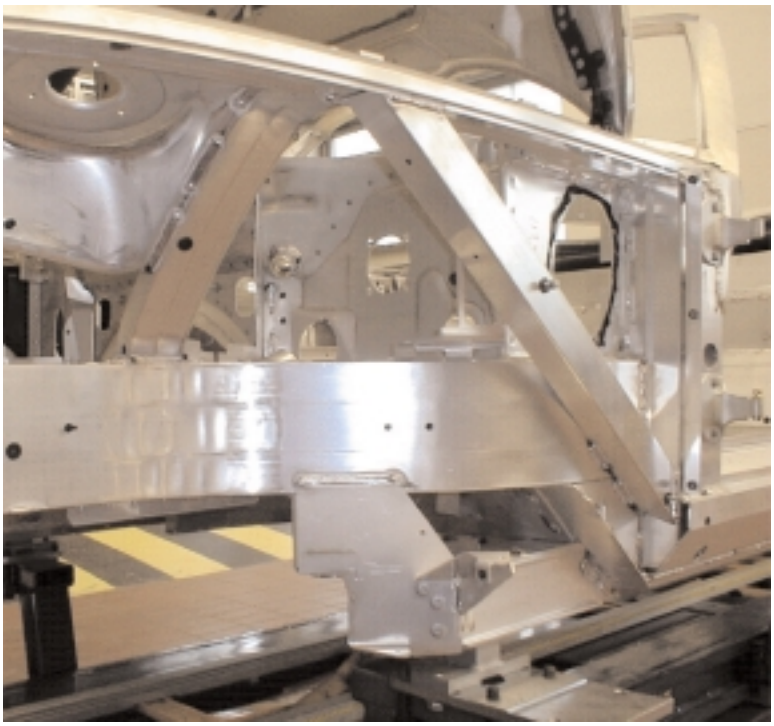
Critical in race car construction for strength and rigidity is the use of “triangulation”.



The left front frame with joint connection (actual) is shown here on the right.

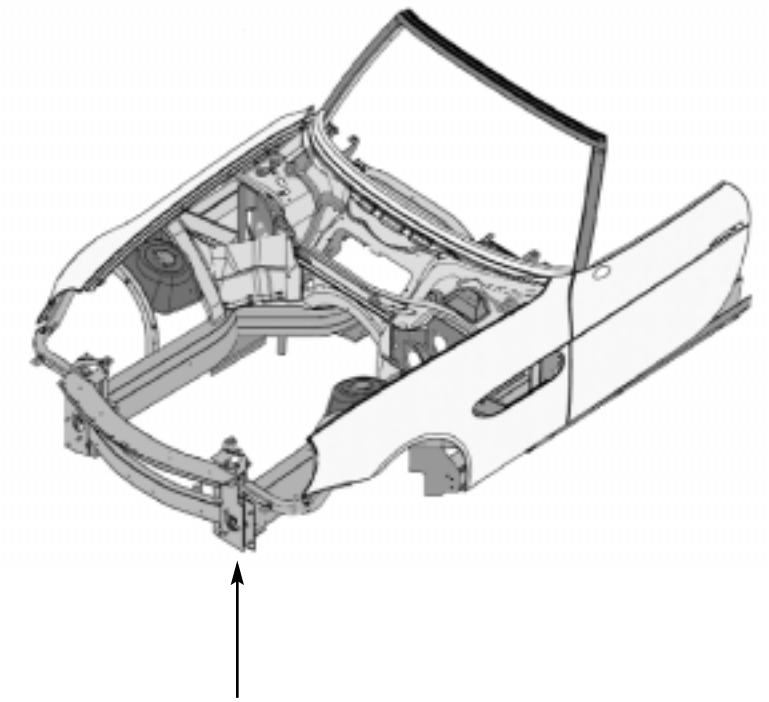
Triangulation can clearly be seen here to reinforce the upper front “clip” rails which support the strut towers.

This type of reinforcing provides excellent support for the aluminum frame.



The front structure illustration on the right highlights the additional frame support behind the front bumper assembly.

The mounting points for the bumper impact absorbers can be seen here.

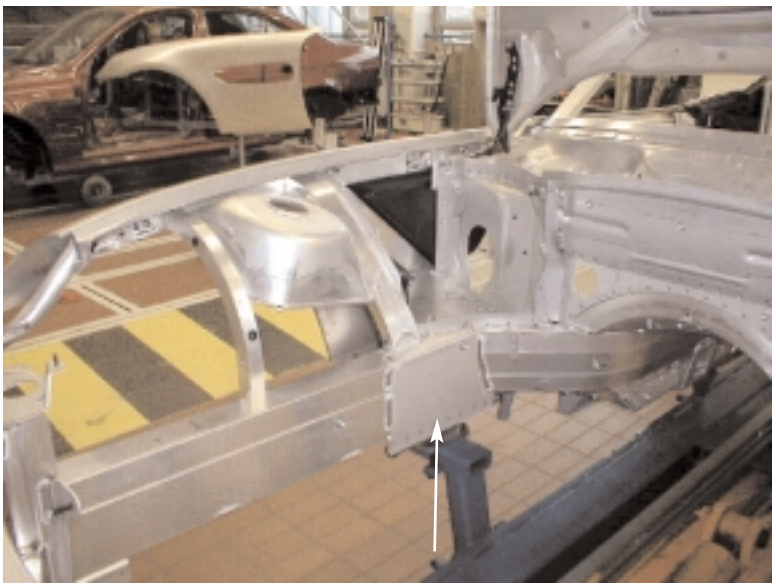


The engine compartment structure shown in this actual view reveals the massive frame rail size.

The aluminum strut tower structure can be seen here on the right which is supported by two channel braces that connect with the upper support rail.

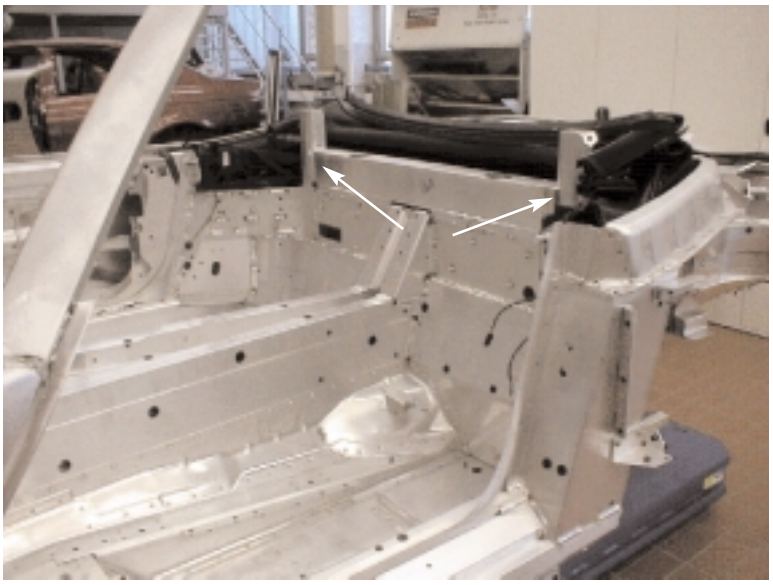
This method of construction reduces weight in the inner fender well area.

An additional strengthening plate for the frame rail is visible here.

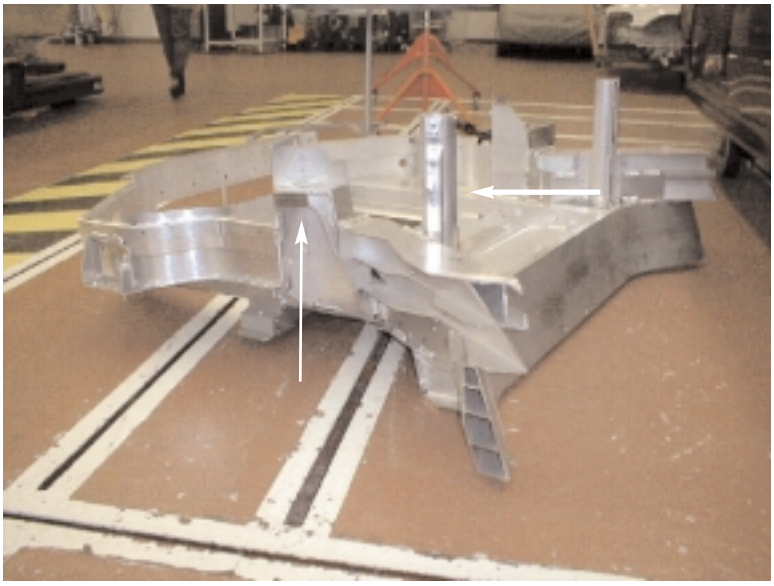


The left rear floor section shown here reveals the inner frame rail mounting to the rear support beam.

The roll bar supports are integral in the main structure.



The rear frame section (right side shown) points out the rear strut tower support and the integral roll bar mounting.

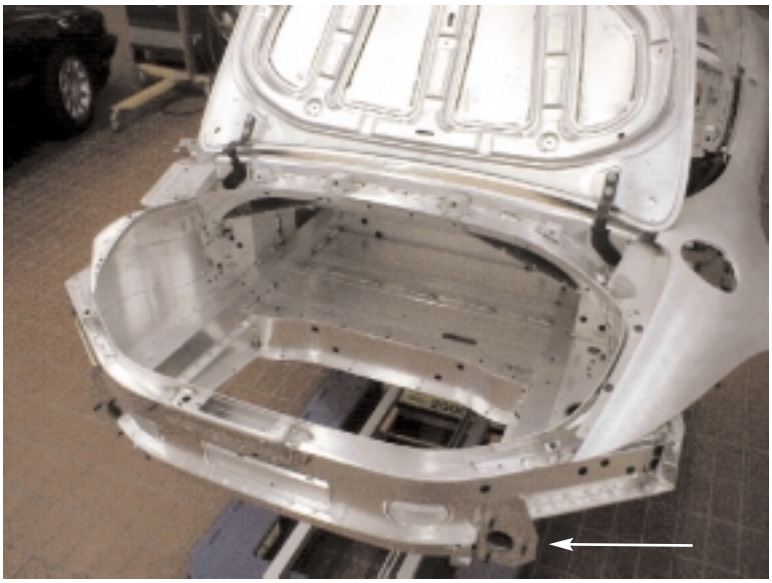


The left rear frame structure shown on the right highlights the upswept rear frame rail and the mounting point for the rear impact absorber.

The luggage compartment view on the right reveals the spacious trunk.

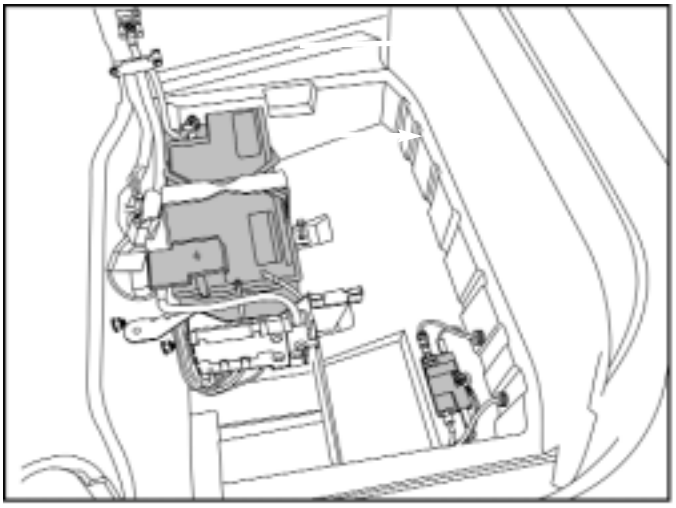
The fuel tank (73l) is forward mounted in this compartment.

Also shown is the massive rear support structure and mounting for the bumper impact absorbers.



The luggage compartment floor insert is a bolt in plastic tray that holds the battery, tool kit, and antenna amplifier.

The view on the right also shows the BST cable and high amp fuses.



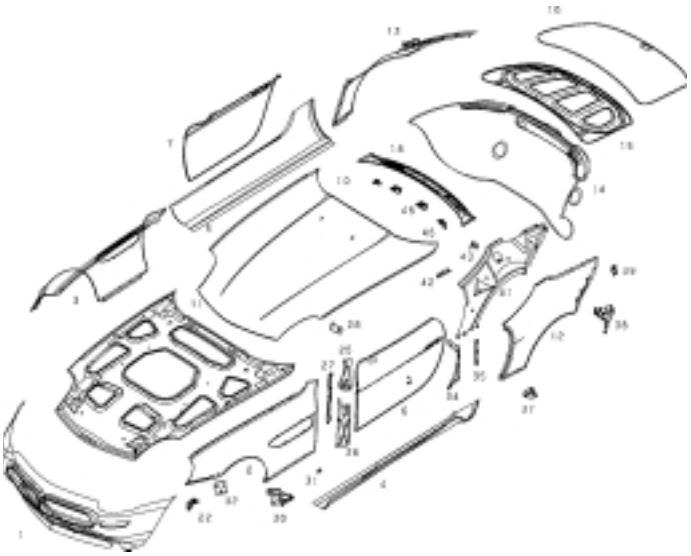
Components

Body - Panel Views

The outer “skin” body panels are all bolt on, minimizing repair time and cost.

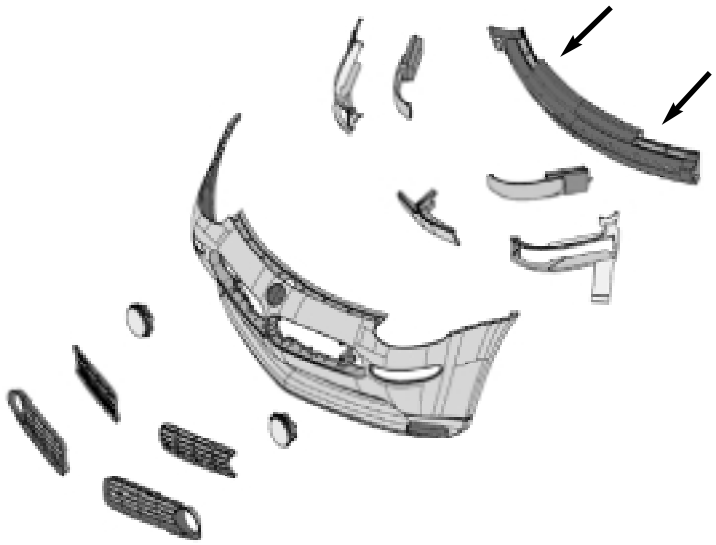
The picture on the right represents the entire body shell and frame structure assembly.

In addition to the bolt on panels shown in this illustration, compound outer panels such as door, hood, and trunk skins are bonded to their support frames.



The illustration on the right is the integrated flexible front bumper assembly.

Notice the impact absorbers are not shown, but they mount to the structural support and into the frame rails.



Pull out (unsnap) the grille panel to access the tow hook mounting point.

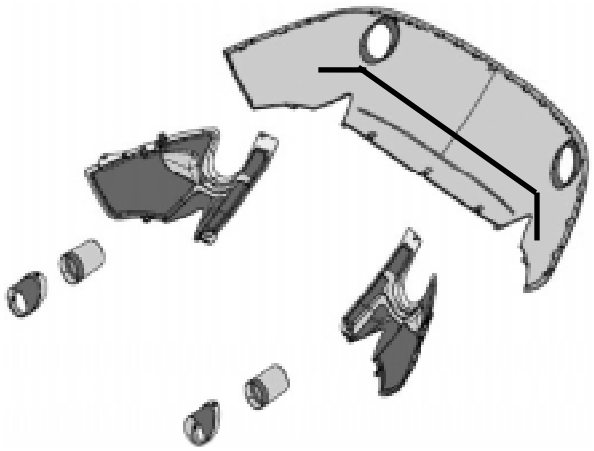
The threaded tow hook is stored in the tool kit.

Shown on the right is the installation position.

The rear bumper assembly with heat insulators is shown to the right. The AM/FM/ Telephone antenna is located across the flexible panel.

Notice the impact absorbers are not shown, but they mount the rear bumper assembly to the rear frame rails.

The exhaust tips are attached to the rear bumper assembly.



To access the rear tow hook mounting, push on release tab of the split reflective lens as indicated in this picture.

The threaded tow hook is located in the tool kit.

The exhaust tip can also be seen here which is attatched to the bumper assembly.

Rollbar

The fixed rollbars are made of high strength extruded aluminum sections.
The rollbar is fitted in a sleeve, to which it is insulated by a cushion of vulcanized material.

This vulcanized material can deform under heavy load allowing the rollbar to move within a predetermined range. Therefore; the rollbar can reduce forces to the head in the event of a rear end collision.

To ensure the body mounts are not damaged by the very firm rollbar under extreme load, the rollbar features defined deformation points at which it can kink without sheering.

1. High strength aluminum extruded section

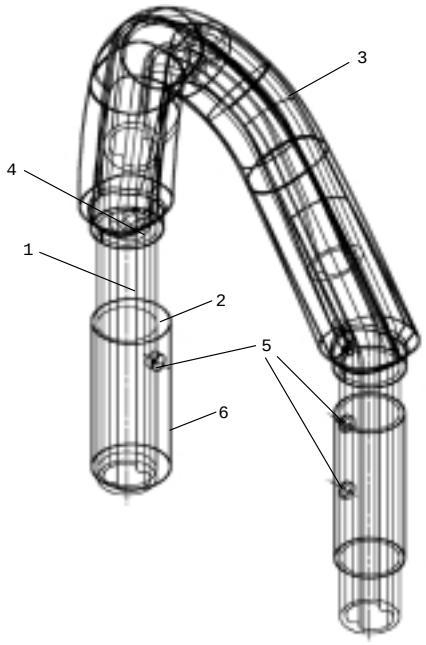
2. Vulcanized material

3. Foam jacketing material with leather cover

4. Defined deformation point

5. Mounting points

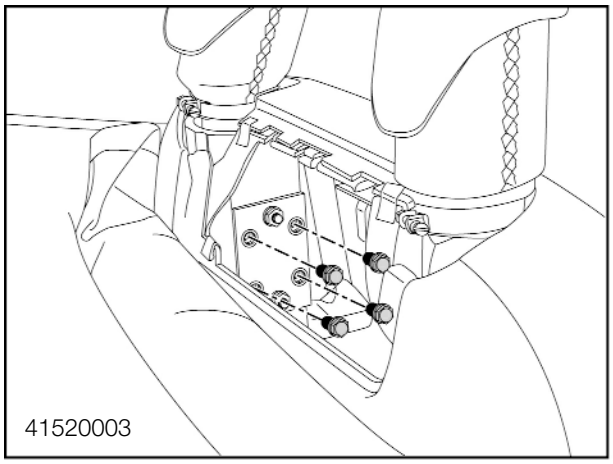
6. Sleeve



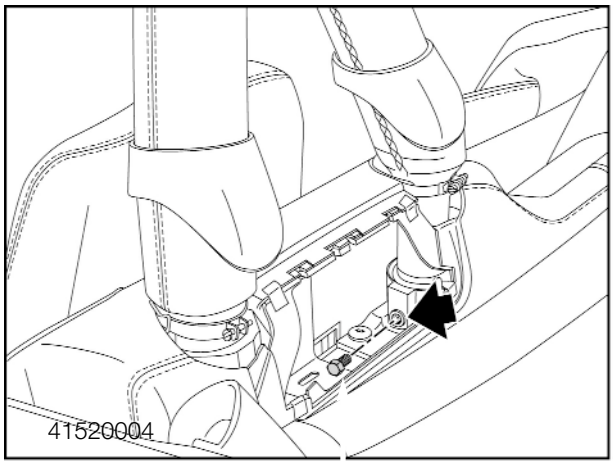
The rollbar is connected to the body mount by a sleeve.

Rollbar Mounting

To remove the roll bars, gently slide the chrome base covers up as shown on the right. Unsnap the cover panel from the top and fold down to remove.

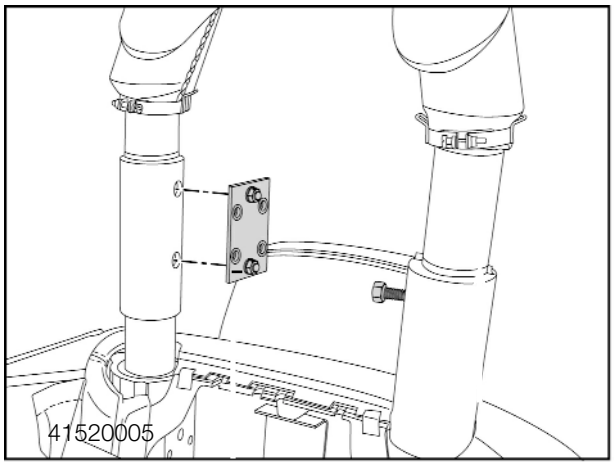


Remove the mounting bolts, four 10 mm on the outside (shown on the right), and one 13 mm on the inside (shown below), of the roll bars.



The roll bar has been removed from the mounting sleeves to allow visibility of the single mounting bolt on the right, and the four bolt locating plate on the left.

Note: The mounting bolts exert a certain force (determined by the tightening torque) on the extruded section of the roll-bar. Be sure to engage the pins on the locating plate in the roll bar before tighting.



Repair Concept

- The Z8 requires special attention when body repair is needed due to the all aluminum construction. It is important to note that body repair methods on aluminum widely differ from those methods used on steel.

- Please, review the following information on Repair Concept and share the information with other BMW Center personnel. This information reflects engineering and design, repair work in general, and our recommendation for implementation.

- With consideration for engineering, repair equipment availability, quality requirements, know how, investment outlay, ***three levels*** of repair are outlined:

Level 1 - "light duty" repair:	scratches dents bolt on panel replacement paint work
Level 2 - "medium duty" repair:	frame rail sectioning the use of epoxy bonding and riveting repairs requiring frame/body fixtures repairs requiring dimensioning tools
Level 3 - "heavy duty" repair:	frame rail replacement structural panel/support replacement repairs requiring welding repairs requiring the use of frame/body fixture tools

*level 2 and 3 require specific tools, equipment, and training

Implementation

Level 1 is straight forward and can be performed by a competent BMW body repair facility, or BMW approved sublet partner repair facility.

Due to the complexity, skill, tools and equipment required for *Level 2* and *3* repairs it is HIGHLY RECOMMENDED to have the vehicle repaired at one of the BMW authorized repair centers:

BMW of North America, Inc.
Montvale, NJ

BMW Performance Center
Greer, SC

BMW of North America, Inc.
Oxnard, CA

Quality repairs are need to maintain sound structural integrity and value preservation of the Z8 as well as all other BMWs.

The locations listed above are recommended as they have the specialized equipment required and factory collision repair technicians, possessing the skill need to perform proper Z8 repairs.

Please, refer to any Aftersales announcements such as the Service Information Bulletins for outlined specific details.

Review Questions

1. What is the most important point about replacing the rollbar?
   _____
   _____

2. Where are the recommended repair facilities for a level 2 or 3 body repair?
   _____
   _____

3. What are the two major frame structures that add to the rigity of the Z8?
   _____
   _____
   _____